

Accommodations Toolkit

Math Charts/Tables: Research



This fact sheet on **math charts/tables** is part of the *Accommodations Toolkit* published by the National Center on Educational Outcomes (NCEO). It summarizes information and research findings on math charts as an accommodation.^[1] The toolkit also contains a summary of states' accessibility policies for math charts ([/nceo/accommodations-toolkit/math-charts-tables-policies](https://nceo/accommodations-toolkit/math-charts-tables-policies)).

multiplication table

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

What are math charts? Math charts or arithmetic tables may help some students with disabilities perform arithmetic operations of addition, subtraction, multiplication, and division (Spurlock, 2020). Some students use math charts as an accommodation on state assessments in lieu of other accommodations for math such as a calculator, manipulative, or abacus (Anjorin, 2009).

What are the research findings on who should use this accommodation? Research has shown that students who may benefit from using math charts on assessments are students with specific learning disabilities (Anjorin, 2009; Spurlock, 2020) and other disabilities such as autism, attention-deficit/hyperactivity (ADHD), language impairment, and intellectual disabilities (Spurlock, 2020).

What are the research findings on the implementation of math charts? Two studies examined math charts as an accommodation for students with various disabilities at different grade levels.

- A study of elementary students with various disabilities who used multiplication math charts found that these students had significantly higher test scores on common core-based mathematics class assessments than students with disabilities who did not have access to the accommodation (Spurlock, 2020).
- A study compared the use of math charts between students with specific learning disabilities and students without disabilities (Anjorin, 2009). Math charts and arithmetic tables were provided either individually or as part a package with various other accommodations. However, the type of math chart and effect of math charts provided individually were not differentiated from other types of mathematics accommodations (i.e., calculator, manipulative, abacus). Within the five combinations of accommodations for math tests that were analyzed in this study, math charts were provided in four of them. The study found item-level performance data patterns for students with specific learning disabilities and without disabilities were not associated with accommodations use; however, the potential for math charts was inconclusive since the data was not analyzed separately for the math chart accommodation.

What perceptions do students and teachers have about math charts? One study provided findings on teachers' perceptions of math charts, specifically multiplication charts.

- General education and special education teachers perceived multiplication math charts to be useful for students' understanding of mathematics and for encouraging them to be independent. However, teachers also indicated that a limitation was that some students still struggled with using the math charts even after multiple efforts to instruct the students on how to use them (Spurlock, 2020).

What have we learned overall? The research suggests that math charts benefit students with various disabilities at different grade levels, though it is inconclusive to what extent they are beneficial. Moreover, elementary students sometimes struggle with learning how to use math charts despite teachers' perceptions that math charts are helpful and support improved understanding of mathematics. Additional research is needed to identify which students may benefit from using different types of math charts and to measure their effect on students' test scores. There is also a need for research that compares the effectiveness of math charts, calculators, and other accommodations (e.g., manipulatives, abacus) that support math operations.

Footnotes

► [1]

Research on math charts summarized here is also available in NCEO's searchable *Accommodations for Students with Disabilities Bibliography* (<https://nceo.info/Resources/bibliographies>) and in NCEO syntheses of research from 1999 through 2018 (see summaries for: 1999–2001  (<https://nceo.umn.edu/docs/OnlinePubs/TechReport34.pdf>), 2002–2004  (<https://nceo.umn.edu/docs/OnlinePubs/Tech45/Technical45.pdf>), 2005–2006  (<https://nceo.umn.edu/docs/OnlinePubs/Tech47/TechReport47.pdf>), 2007–2008  (<https://nceo.umn.edu/docs/OnlinePubs/Tech56/TechnicalReport56.pdf>), 2009–2010  (<https://nceo.umn.edu/docs/OnlinePubs/Tech65/TechnicalReport65.pdf>), 2011–2012  (<https://nceo.umn.edu/docs/OnlinePubs/Synthesis94/Synthesis94.pdf>), 2013–2014  (<https://nceo.umn.edu/docs/OnlinePubs/Report402/NCEOReport402.pdf>), 2015–2016  (<https://nceo.umn.edu/docs/OnlinePubs/NCEOReport412.pdf>), 2017  (<https://nceo.umn.edu/docs/OnlinePubs/NCEOReport418.pdf>), 2018  (<https://nceo.umn.edu/docs/OnlinePubs/NCEOReport423.pdf>), 2019  (<https://nceo.umn.edu/docs/OnlinePubs/NCEOReport433.pdf>). See the reports and online bibliography for additional information about the criteria used to identify studies included in this fact sheet.

References

- Anjorin, I. (2009). *High-stakes tests for students with specific learning disabilities: Disability-based differential item functioning* (Publication No. 3390841) [Doctoral dissertation, Southern Illinois University at Carbondale]. ProQuest Dissertations and Theses Global.
- Spurlock, C. D. (2020). *The impact of class accommodations for inclusion students on common core aligned math assessments* (Publication No. 28022417) [Doctoral dissertation, Trevecca Nazarene University]. ProQuest Dissertations and Theses Global.

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